

REMARKS

Pursuant to the present amendment, claims 1, 6-10, 13-16, 20 and 25-29 have been amended, claims 30-41 have been canceled, and new claims 42-54 have been added. Thus, claims 1-29 and 42-54 are pending in the present application. No new matter has been introduced by way of the present amendment. Reconsideration of the application is respectfully requested.

As an initial matter, claims 30-41, which were directed to a non-elected invention subject to a previous restriction requirement issued by the Patent Office, have been canceled. Applicants specifically reserve the right to pursue the subject matter defined by claims 30-41 in a later filed application should they so desire.

In the Office Action, claims 1-29 were rejected under 35 U.S.C. § 112 as allegedly being incomplete in that the Examiner believed that the claims failed to include the step of coating a photoresist layer on the anti-reflective coating (ARC). Office Action at p. 2. As recognized by the Examiner, the present invention is generally directed to determining various optical properties of the anti-reflective coating and, based upon those determined properties, adjusting one or more parameters of a separate exposure process. These parameters may be measured with or without a layer of photoresist being formed above the anti-reflective coating. The Examiner contends that it is conventional practice that the measurement of such optical characteristics of the anti-reflective coating layer be made with a layer of photoresist positioned above the anti-reflective coating layer. In fact, as is clear from the prior art cited by the Examiner, optical characteristics of layers can be measured with or without the existence of a layer of photoresist. Even assuming for purposes of argument that that is true, the disclosure of the present

application makes it clear that all the claimed invention requires is measurement of the optical characteristics of the ARC layer. That is, according to the claimed invention, the presence of absence of the photoresist layer is simply irrelevant. Thus, it is believed that the Examiner's characterization of the presence or absence of a layer of photoresist as amounting to an "essential element" is believed to be incorrect. It is believed that such a characterization would only be proper if, and only if, the optical characteristics of the anti-reflective coating layer could not be measured without the presence of the layer of photoresist. The undersigned does not believe the Examiner contends that the optical characteristics of the anti-reflective coating layer could not be measured without the photoresist layer in place. However, if the Examiner wishes to take such a position, a record citation to prior art relied upon by the Examiner for such a position would be appreciated. Absence such a showing, it is believed that the Examiner's characterization of the presence of a layer of photoresist as being essential is improper. Accordingly, Applicants respectfully submit the Examiner's Section 112 rejection should be withdrawn.

With respect to prior art, claims 1-29 were rejected under 35 U.S.C. § 102(e), or in the alternative under 35 U.S.C. § 103(a), as allegedly being anticipated by or obvious in view of Ling (U.S. Patent No. 6,368,762). Claims 1-4, 6-11, 13-15, 17-23 and 25-29 were rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Bhakta (U.S. Patent No. 6,482,573). Claims 1-4, 6-11, 13-15, 17-23 and 25-29 were rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Brown (U.S. Patent No. 6,689,519). Claims 5, 12, 16 and 24 were rejected under 35 U.S.C § 103(a) as allegedly being unpatentable over Bhakta or Brown in view of Ruelke (U.S. Patent Publication 2002/0076843). Applicants respectfully traverse the Examiner's rejections.

As the Examiner well knows, an anticipating reference by definition must disclose every limitation of the rejected claim in the same relationship to one another as set forth in the claim. *In re Bond*, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). To the extent the Examiner relies on principles of inherency in making the anticipation rejections in the Office Action, inherency requires that the asserted proposition necessarily flow from the disclosure. *In re Oelrich*, 212 U.S.P.Q. 323, 326 (C.C.P.A. 1981); *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1463-64 (Bd. Pat. App. & Int. 1990); *Ex parte Skinner*, 2 U.S.P.Q.2d 1788, 1789 (Bd. Pat. App. & Int. 1987); *In re King*, 231 U.S.P.Q. 136, 138 (Fed. Cir. 1986). It is not enough that a reference could have, should have, or would have been used as the claimed invention. “The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *Oelrich*, at 326, quoting *Hansgirg v. Kemmer*, 40 U.S.P.Q. 665, 667 (C.C.P.A. 1939); *In re Rijckaert*, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1993), quoting *Oelrich*, at 326; see also *Skinner*, at 1789. “Inherency ... may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *Skinner*, at 1789, citing *Oelrich*. Where anticipation is found through inherency, the Office’s burden of establishing *prima facie* anticipation includes the burden of providing “...some evidence or scientific reasoning to establish the reasonableness of the examiner’s belief that the functional limitation is an inherent characteristic of the prior art.” *Skinner* at 1789.

Moreover, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success.

Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); M.P.E.P. § 2142. Moreover, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974). If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); M.P.E.P. § 2143.03.

With respect to alleged obviousness, there must be something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561 (Fed. Cir. 1986). In fact, the absence of a suggestion to combine is dispositive in an obviousness determination. *Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573 (Fed. Cir. 1997). The mere fact that the prior art can be combined or modified does not make the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990); M.P.E.P. § 2143.01. The consistent criterion for determining obviousness is whether the prior art would have suggested to one of ordinary skill in the art that the process should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art. Both the suggestion and the expectation of success must be founded in the prior art, not in the Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); *In re O'Farrell*, 853 F.2d 894 (Fed. Cir. 1988); M.P.E.P. § 2142.

Applying these legal standards, it is respectfully submitted that all pending claims are in condition for immediate allowance. Pursuant to the present amendment, independent claims 1, 10, 16 and 20 have been amended to recite that the determined optical characteristic is at least one of an index of refraction and an extinction coefficient of the ARC layer. As thus amended, it is respectfully submitted that the pending claims 1-29 are allowable over the art of record.

As an initial matter, three of the references identified by the Examiner (Ling, Bhakta and Ruelke) are all commonly owned by the assignee of the present application. As indicated by the Examiner, each of these references (Ling, Bhakta and Ruelke) are prior art to the present application only under 35 U.S.C. § 102(e). Accordingly, these references cannot be applied against the present application in an obviousness rejection under 35 U.S.C. § 103. That is, these references are only valid against the present application if they anticipate the pending claims. As shown more fully below, the pending claims are allowable over all of the prior art identified by the Examiner. For the record, according to MPEP § 706.02(I)(1), “effective November 29, 1999, subject matter which was prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e) is now disqualified as prior art against the claimed invention if that subject matter the claimed invention ‘were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.’” The present application was filed on or after November 29, 1999. Furthermore, the present application and Ling (U.S. Patent No. 6,368,762), Bhakta (U.S. Patent No. 6,482,573) and Ruelke (U.S. Patent Publication 2002/0076843) were, at the time the present invention was made, owned by the same entity or subject to an obligation of assignment to the same entity, namely Advanced Micro Devices. Thus, Applicants respectfully submit that

the Ling, Bhakta and Ruelke references are not available as prior art in any obviousness determination.

Ling discloses a process for reducing the critical dimension variation of semiconductors on a wafer due to the variation in thickness of an underlying nitride layer wherein the lithographic exposure level is varied based upon the measured thickness of the nitride layer. Abstract; Col. 4, l. 49 – Col. 5, l. 4. However, at no point does Ling disclose or suggest determining at least one of an index of refraction and an extinction coefficient of the ARC layer and, based upon that determined parameter, determining at least one parameter of a stepper exposure process and performing that stepper exposure process on at least one wafer. Accordingly, Ling does not anticipate the invention defined by amended independent claim 1. Similar reasoning applies with respect to amended independent claims 10, 16 and 20.

Bhakta is likewise directed to a methodology of reducing variations in critical dimensions of features formed using photolithography. To that end, Bhakta discloses measuring the reflectivity of the photoresist layer and their underlying layer, such as a polysilicon layer, and adjusting the exposure level of the photoresist in accordance with the measured reflectivity. Abstract. However, as with Ling above, Bhakta does not disclose nor suggest determining at least one of an index of refraction and an extinction coefficient of the ARC layer, determining based upon these measured characteristics at least one parameter of a stepper exposure process and performing that stepper exposure process, comprised of the determined parameter, on at least one wafer. Bhakta, like Ling, is simply silent with respect to the issue of index of refraction and extinction coefficient. Accordingly, Bhakta does not anticipate amended claims 1, 10, 16 or 20.

Ruelke was only applied by the Examiner as a secondary reference in rejecting claims 5, 12, 16 and 24 under 35 U.S.C. § 103 as allegedly being obvious. As indicated above, Ruelke cannot properly be used against the present application in a Section 103 analysis. Thus, the Examiner's rejection of claims 5, 12, 16 and 24 is legally improper. Moreover, it is respectfully submitted that Ruelke does not disclose nor suggest the invention set forth in amended independent claims 1, 10, 16 and 20. More specifically, Ruelke is generally directed to a methodology wherein a protection layer is formed above an ARC layer so as to prevent a layer of photoresist from contacting the underlying ARC layer. The purpose of the protection layer is to eliminate the reaction between the photoresist and the nitrogen contained in the ARC layer during the exposure and development of the photoresist layer. ¶ 24.

The patent to Brown is likewise believed to be far afield from the present invention. In fact, as understood by the undersigned, Brown is directed to measuring at least one property of a photoresist layer and altering a parameter of the photolithography process to reduce within-wafer variations of critical dimensions of features formed on the wafer. Abstract. However, Brown does not disclose nor suggest measuring an index of refraction and/or an extinction coefficient of an ARC layer for any purposes whatsoever. Thus, it is respectfully submitted that pending independent claims 1, 10, 16 and 20 are allowable over Brown.

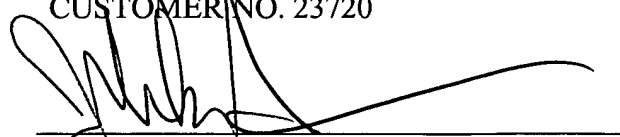
New claims 42-45 have been added to further limit their respective independent claims by requiring the step of performing the stepper exposure process, comprised of the determined parameter, on at least one additional wafer. Support for this limitation is found at, for example, page 13, line 18 – page 14, line 4. Allowance of newly added dependent claims 42-45 is respectfully requested.

New claims 46-54 have also been added to further define Applicants' invention. While new independent claim 46 is directed to determining a generic "optical characteristic of the ARC layer," claim 46 requires the step of performing the stepper exposure process comprised of the determined parameter on at least one wafer other than the first wafer. That is, according to this methodology, many additional wafers may be processed using a stepper exposure process wherein at least one parameter of the stepper exposure process is determined based upon the optical characteristics of an ARC layer formed above a first wafer. At no point does the prior art of record disclose or suggest the methodology set forth in claim 46 as defined by the entirety of the steps set forth therein. Accordingly, new claims 46-54 are likewise in condition for allowance.

In view of the foregoing, it is respectfully submitted that all pending claims are in condition for immediate allowance. The Examiner is invited to contact the undersigned attorney at (713) 934-4055 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,

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